

Specification 5100-243c  
September 1996  
Superseding  
Specification 5100-243b  
May 1982

**UNITED STATES DEPARTMENT OF AGRICULTURE**  
**FOREST SERVICE**  
**SPECIFICATION FOR**  
**NOZZLE, FIRE HOSE, MOP-UP**

1. SCOPE.

1.1. Scope. The nozzle described in this specification is a garden style 3/4 inch 11-1/2 NH mop-up nozzle. By rotating the barrel of the nozzle from shutoff, the discharge can be adjusted for high-velocity low-volume spray, straight stream, and low-velocity high-volume spray.

2. APPLICABLE DOCUMENTS.

2.1. Government Documents. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issue of these documents are those in effect on the date of the invitation for bids or request for proposals (see 6.2).

USDA Forest Service Standard

5100-190 - Threads, Gaskets, Rocker Lugs, Connections and Fittings, Fire Hose

Federal Specifications

QQ-A-225 - Aluminum and Aluminum Alloy Bar, Rod, Wire, or Special Shapes; Rolled, Drawn, or Cold Finished; General Specification for

QQ-A-225/10 - Aluminum Alloy Bar, Rod, and Wire; Rolled, Drawn, or Cold Finished, 6262

QQ-A-367 - Aluminum Alloy Forgings

Copies of federal specifications are available from General Services Administration, Federal Supply Service Bureau, Specification Section, Suite 200, 470 East L'Enfant Plaza SW, Washington DC 20407.

Copies of USDA Forest Service Standards are available from USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773-3198.

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Beneficial comments, recommendations, additions, deletions and any pertinent data that may be used in improving this document should be addressed to: USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773-3198 by using the Specification Comment Sheet at the end of this document or by letter.

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2.2. Non-Government Publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those in effect on the date of the invitation for bids or request for proposals.

American National Standards Institute (ANSI)/American Society for Quality Control (ASQC)

Z 1.4 - Sampling Procedures and Tables for Inspection by Attributes

Address requests for copies to the American National Standards Institute Inc., 11 West 42nd Street, New York, NY 10036.

American Society for Testing and Materials (ASTM)

B 16 - Specifications for Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines

B 26 - Aluminum-Alloy Sand Castings

B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B 241 - Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube

B 584 - Specifications for Leaded Red Brass and Leaded Semi-Red Brass Sand Castings

E 380 - Practice for Use of the International System of Units

Address requests for copies to American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

Non-Government standards and other publications normally are available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.

2.3. Order of Precedence. In the event of conflict between the text of this document and the reference cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

### 3. REQUIREMENTS.

3.1. First Article. Unless otherwise specified, first article inspection shall be performed on a product sample(s), in accordance with 4.4.3.

3.2. Construction. The nozzle shall be adjustable by barrel rotation and be a periphery-jet type. Inlet and outlet shall be axially in alignment throughout all positions. The nozzle may be extruded, cast, forged or machined. At the fully open position, the threads on the spindle shall not be exposed. The discharge end shall be removable for disassembly of the barrel from the spindle, to permit cleaning and repair. A gasket shall be installed in the female threaded section. See Figure 1 for configuration. Figure 1 is provided for information only and is not intended to designate a particular design or manufacturer.

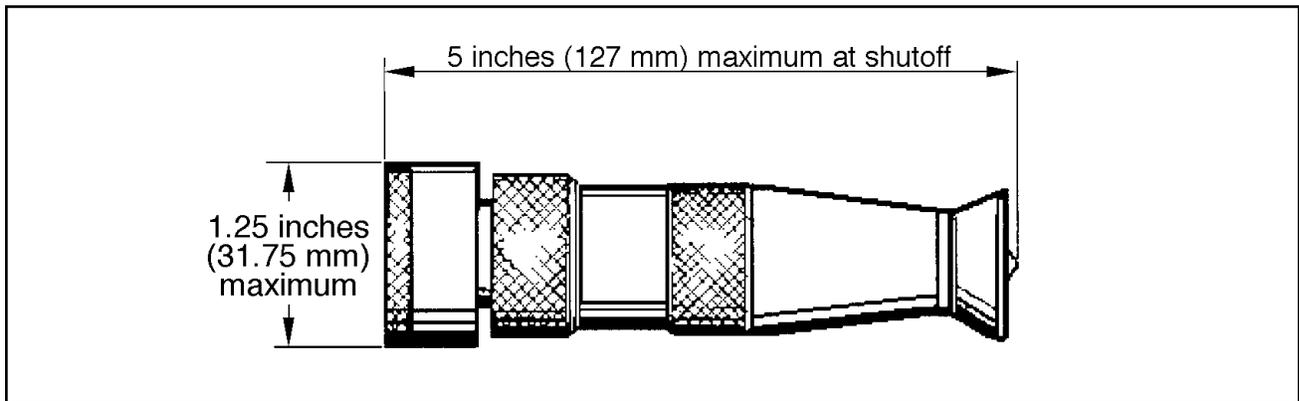


Figure 1. Nozzle configuration.

3.2.1. Sequence of Operation. The closed or shutoff position shall be when the barrel is fully contracted. The sequence of operation as viewed by the operator, rotating the barrel counterclockwise, from the shutoff position, the nozzle shall produce a high-velocity low-volume spray, wide-angle spray, straight stream, and low-velocity high-volume spray.

3.2.2. Knurling. The barrel and spindle base shall be knurled for a non-slip grip as indicted in Figure 1.

3.3. Materials. Where more than one type of material is used in various components, there shall be no incompatibility between materials which may cause corrosion.

3.3.1. Nozzle Materials. Nozzle materials shall be brass or aluminum and shall conform to the following:

- a. Free-cutting brass rod, in accordance with ASTM B 16 or
- b. Cast brass, copper alloy No. 836, in accordance with ASTM B 584 or
- c. Cast aluminum alloy, 40E, in accordance with ASTM B 26 or
- d. Extruded aluminum alloy, 6061-T6, in accordance with ASTM B 221 and ASTM B 241 or
- e. Forged aluminum alloy, 6061-T6, in accordance with Federal Specification QQ-A-367 or
- f. Aluminum alloy, 6262-T9, in accordance with Federal Specifications QQ-A-225 and QQ-A-225/10.

3.3.2. Gasket Material. Gasket material and physical properties shall meet the requirements of USDA Forest Service Standard 5100-190.

3.3.3. Recoverable Materials. The contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR), provided all performance requirements of this specification are met.

3.4. Dimensions and Weight. Dimensions shall be as shown in Figure 1. Maximum weight of the nozzle shall be 14 ounces (0.40 kg).

3.4.1. Dimensional Tolerance. Unless otherwise noted, the following tolerances apply: one place (x.x) +/- 0.1 inch (2.5 mm); two places (x.xx) +/- 0.01 inch (0.25 mm) and three places (x.xxx) +/- 0.010 inch (0.254 mm).

3.5. Workmanship. Workmanship shall be equal to the best commercial practices consistent with the highest engineering standards in the industry and shall be free from any defect which may impair serviceability or detract from the product's appearance.

3.5.1. Symmetry. All metal part sections shall be symmetrical and concentric to 0.030 inch (0.762 mm).

3.5.2. Forged or Extruded Components. Forged and extruded sections shall be free from laps, sharp die marks, cracks or other defects.

3.5.3. Cast Components. Cast parts shall be fine-grained, free from blowholes, pinholes, pits, porosity, hard spots, shrinkage, cracks or other defects.

3.6. Threads, Waterways, Gaskets, and Gasket Recesses. All threads, waterways, gaskets and gasket recesses shall be in accordance with USDA Forest Service Standard 5100-190.

3.7. Marking. Markings shall be in accordance with USDA Forest Service Standard 5100-190. In addition, the nozzle shall be marked with "250 WP".

3.8. Surface Treatment. Aluminum alloy surfaces, to include threaded surfaces, shall be hardcoated in accordance with USDA Forest Service Standard 5100-190.

3.9. Surface Finish. The finish for all surfaces, to include threaded surfaces, shall be in accordance with USDA Forest Service Standard 5100-190.

3.10. Performance.

3.10.1. Flow Rate. When tested in accordance with 4.6.2, the minimum nozzle discharge flow rate at 100 psig (689 kPag) nozzle inlet pressure for positions 1 to 3, (see 4.6.2.1) shall be as indicated in Table 1.

Table 1. Flow Rate for Nozzle Positions

Nozzle Position Number	Minimum Flow Rate @ 100 psig (689 kPag)	
	gpm	(L/m)
1	4	(15.15 )
2	5	(18.93)
3	8	(30.00)

3.10.2. Proof Pressure. When tested in accordance with 4.6.3, the garden nozzle shall withstand 450 psig (3102 kPag) hydrostatic pressure with no permanent deformation, mechanical damage or structural failure. The combined leakage from the nozzle tip, spindle section and connection shall not exceed twelve drops per minute.

3.11. Metric Products. Metric dimensions are provided for information only, inch-pound units shall be the required units of measure for this specification. The thread series designation is indicated as 3/4 inch NH. Since this is a thread series designation, not an indication of a specific dimension, the metric equivalent is not given. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, provided they fall within the tolerances specified using conversion tables contained in the latest revision of ASTM E 380, and all other requirements of this specification are met.

#### 4. SAMPLING, INSPECTION AND TEST PROCEDURES.

4.1. General Inspection and Tests. Unless otherwise specified in the contract or purchase order, the contractor is responsible for performance of all inspection requirements prior to submission for Government acceptance inspection and tests. The contractor may utilize their own facilities or any commercial laboratory acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government.

4.1.1. Inspection and Test Site. The Government shall conduct lot acceptance inspection and tests to determine compliance with the specification. If lot acceptance and tests are conducted at locations other than the manufacturing facilities, the contracting officer will specify location and arrangements. In the case of on-site inspections at the contractor's facility, the contractor shall furnish the inspector all reasonable facilities for their work. During any inspection, the inspector may take from the lot one or more samples and submit them to an independent test laboratory approved by the Government or to a Government test facility for inspection and tests.

4.1.2. Testing With Referenced Documents. The contractor is responsible for insuring that components and materials used were manufactured, examined and tested in accordance with referenced specifications and standards. The Government reserves the right to perform any of the inspections or tests set forth in this section where such action is deemed necessary to assure supplies and services conform to prescribed requirements.

4.2. Responsibility for Compliance. All items shall meet all requirements of sections 3 and 4. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in this specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.3. Sampling for Inspection. When inspection is performed, sampling shall be in accordance with ANSI/ASQC Z 1.4.

4.3.1. Lot. All garden hose mop-up nozzles of one size presented together in one delivery shall be considered a lot for the purpose of inspection. A sample unit shall be one garden hose mop-up nozzle.

4.3.2. Sampling for Visual and Dimensional Examination. Sampling for visual and dimensional examination shall be S-3, with an Acceptable Quality Level (AQL) of 1.5 percent defective.

4.3.3. Sampling for Lot Acceptance Tests. Sampling for lot acceptance testing shall be S-3 with an AQL of 1.5 percent defective.

#### 4.4. Inspection and Tests.

4.4.1. Visual and Dimensional Examination. When selected in accordance with 4.3.2, each sample nozzle shall be visually and dimensionally examined to determine conformance with this specification. Visual or dimensional defects shall be classified as major or minor. A defect not listed in Table 2 shall be classified as a minor defect. If the number of defects in any sample exceeds the indicated AQL, the lot shall be rejected.

Table 2. Major and Minor Defects

Defect	Classification	
	Major	Minor
1. Material not as required.	X	
2. Inlet and outlet not axially in alignment.	X	
3. Nozzle assembly not complete.	X	
4. Dimensions or weight not as required.	X	
5. Thread dimensions not within specified tolerances and failure to pass gage tests.	X	
6. Workmanship and finish not as required.	X	
7. Threads not smooth and not free of imperfections.		X
8. Illegible or improper marking.		X

4.4.2. Lot Acceptance Tests. Each of the samples selected in accordance with 4.3.3, shall be tested in accordance with 4.6, to determine conformance with requirements of this specification.

4.4.3. First Article Inspection. Unless otherwise specified (see 6.2), the first article sample(s) indicated in 3.1, shall be inspected as specified in 4.4.1 and 4.6. All inspection and testing of the first article sample(s) will stop upon a single failure and the sample(s) rejected. The contractor will be informed as to the nature of the failure, but the Government shall not be obligated to continue testing a defective item, once it is known to be defective.

4.4.4. Quality Conformance Inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with ANSI/ASQC Z 1.4. The inspection level and AQL shall be as specified in 4.3.3.

4.5. Certificate of Conformance. A Certificate of Conformance shall meet the requirements of USDA Forest Service Standard 5100-190. Where certificates of conformance are required, the Government reserves the right to verify test any such items to determine the validity of certification. These certificates shall be based on the testing of component materials and may be performed by the component material supplier. The contractor shall provide certificates of conformance for all materials used in 3.3.1, 3.3.2 and 3.8. (see 4.5.2, 4.5.3, and 4.5.4.)

4.5.1. Certificates of Conformance in Lieu of Testing. Unless otherwise specified, certificates of conformance may be acceptable in lieu of testing of end items.

4.5.2. Nozzle Material. As required by 3.3.1, nozzle material shall meet the indicated material physical property requirement listed, when tested to defined test method.

4.5.3. Gasket Material Test. As required by 3.3.2, gasket material physical properties shall meet the requirements of USDA Forest Service Standard 5100-190.

4.5.4. Surface Treatment. As required by 3.8, aluminum alloy surfaces, to include threaded surfaces, shall be hardcoated in accordance with USDA Forest Service Standard 5100-190.

4.6. Performance Testing. Samples shall be subjected to the following tests to determine if the samples meet the requirements of this specification.

4.6.1. Fluid Medium. All testing requiring the use of a fluid medium shall be performed using municipally supplied potable water; this shall include, but is not limited to, flow rate testing and pressure testing. If the contractor does not have access to a municipal water supply, the testing shall be performed using any clear fresh water normally available for firefighting. First article testing performed by the Government will be performed using municipally supplied potable water.

4.6.2. Flow Rate Test. As required by 3.10.1, the nozzle shall be tested for flow rate by attaching it to a water pressure source. At a nozzle inlet pressure maintained at 100 psig (689 kPag), the flow rate shall be measured, using a suitable calibrated flow meter or weigh tank.

4.6.2.1. Nozzle Position. The nozzle shall be adjustable so that by rotating the barrel, the nozzle will produce three different flow patterns between the fully closed and fully opened positions. Positions are described from the reference point of the nozzle positioned with the outlet away from the user. The nozzle shall be in the fully closed position with the barrel fully rotated clockwise. The discharge flow patterns from shutoff shall be as follows:

- a. Position 1. High-velocity, low-volume spray, with a minimum 55° discharge cone spray angle, with the barrel about 1/4 open.
- b. Position 2. Straight stream, with the barrel approximately half open.
- c. Position 3. Low-velocity, high-volume spray, with the barrel fully open.

4.6.3. Proof Pressure Test. As required by 3.10.2, the nozzle shall be tested for proof pressure by attaching it to a water pressure source. A hydrostatic pressure of 250 psig (1724 kPag) shall be applied and held for three minutes. The rate for applying hydrostatic pressure shall not be less than 300 psig (2068 kPag) per minute and not more than 600 psig (4137 kPag) per minute, i.e., at a uniform rate over a 10 to 50 second time interval. The combined leakage from the nozzle tip, spindle section and connection shall not exceed twelve drops per minute. There shall be no permanent deformation, mechanical damage or structural failure.

Increase the hydrostatic pressure to 450 psig (3102 kPag) and hold for one minute. The rate for applying hydrostatic pressure is the same, i.e., at a uniform rate over a 20 to 40 second time interval. The combined leakage shall not exceed twelve drops per minute. There shall be no permanent deformation, mechanical damage or structural failure.

Reduce the hydrostatic pressure to 250 psig (1724 kPag) and hold for three minutes. The rate for decreasing the hydrostatic pressure is the same, i.e., at a uniform rate over a 20 to 40 second time interval. The combined leakage shall not exceed twelve drops per minute. There shall be no permanent deformation, mechanical damage or structural failure.

5. PACKAGING, PACKING AND MARKING.

5.1. Packaging, Packing and Marking. The packaging, packing and marking shall be as specified in the contract or order.

6. NOTES.

6.1. Intended Use. The garden hose nozzle described in this specification is for use with Forest Service fire hose during the “mop-up” phase of wildland fire suppression.

6.2. Acquisition Requirements. Acquisition documents should specify the following:

- a. Title, number, and date of the specification.
- b. If first article sampling and inspection is not required (see 3.1, and 4.4.3).
- c. Number of each type of garden hose mop-up nozzle required.
- d. If certificates of conformance are acceptable in lieu of lot by lot testing (see 4.4.2 and 4.5).
- e. Packaging, packing and marking instructions. (see 5.1.)

6.3. First Article. When a first article sample(s) is required, the sample(s) shall be inspected and approved in accordance with the First Article clauses set forth in the solicitation. Specific instructions shall be included regarding arrangements for selection, inspection, and approval of the first article sample(s).

6.4. Notice. When Government drawings, specifications, or other data are used for any purpose other than in connection with a related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatever.

6.5. Preparing Activity. USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas CA 91773-3198.

United States Department of Agriculture, Forest Service  
Standardization Document Improvement Proposal

**Instructions:** This form is provided to solicit beneficial comments which may improve this document and enhance its use. Contractors, government activities, manufacturers, vendors, or other prospective users of this document are invited to submit comments to the USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, California 91773-3198. Attach any pertinent data which may be of use in improving this document. If there is additional documentation, attach it to the form and place both in an envelope addressed to the preparing activity. A response will be provided when a name and address are included.

**Note:** This form shall not be used to submit request for waivers, deviation, or for clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

Standard Number and Title: **Specification 5100-243c, Nozzle, Fire Hose, Mop-Up**

Name of Organization and Address:

\_\_\_\_\_ Vendor      \_\_\_\_\_ User      \_\_\_\_\_ Manufacturer

1. \_\_\_\_\_ Has any part of this document created problems or required interpretation in procurement use?

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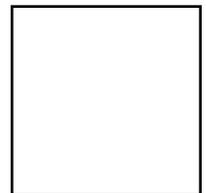
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